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09/802,314	03/08/2001	Kiyoshi Sato	9281/3900	5260

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EXAMINER

CHEN, TIANJIE

ART UNIT PAPER NUMBER

2652

DATE MAILED: 03/15/2004

22

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/802,314

Applicant(s)

SATO ET AL.

Examiner

Tianjie Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 14-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2.16.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

*Non-Final Rejection*

*Election/Restrictions*

1. Applicant's election with traverse of claims 1-13 in Paper No. 7 filed on 02/20/2004 is acknowledged. The traversal is on the ground(s) that "no explanation that one skilled in the art would provide such a process and how the process would function." This is not found persuasive because: it is well known in the art that there are some other processes being used in the art, such as sputtering or evaporation.

The requirement is still deemed proper and is therefore made FINAL.

*Priority*

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

*Claim Objections*

3. Claim 3 is objected to because of the following informalities:

- In claim 3, line 2, --L3-- should be inserted after "distance."

Appropriate correction is required.

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

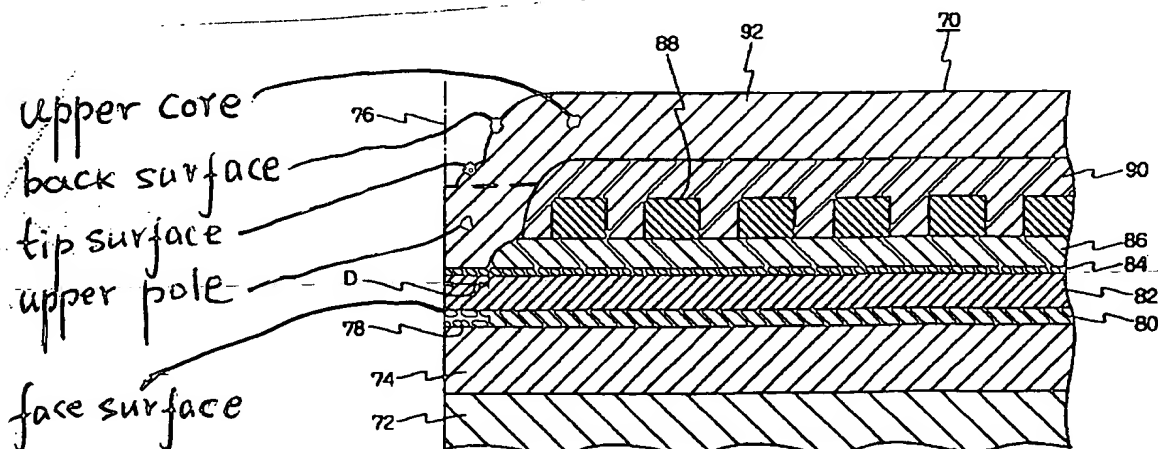
A person shall be entitled to a patent unless--

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claims 1, 2, 3, 6, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Haruo et al (JP 2000-011319) with embodiment shown in Figs.11 and 14.

With regard to claim 1, Haruo et al shows a thin-film magnetic head in Fig. 11 (a copy of Fig. 11 with added numerals is attached below) including: a lower core layer; a recording core formed on the lower core layer and exposed at a face surface that faces a recording medium, the recording core including a structure having a gap layer 84 and an upper pole layer sequentially arranged in that order; an upper core layer magnetically coupled to the upper pole layer; and a coil 88 for inducing a recording magnetic field to the lower core layer, the recording core, and the upper core layer, wherein a tip surface of the upper core layer is located at a setback distance from the face surface in a height direction, wherein the height direction is a direction generally perpendicular to the face surface, and the tip surface is a curved surface, such that the setback distance gradually increases in a track width direction, wherein the track width direction is a direction generally parallel to the face surface (Fig. 14).



With regard to claim 2, Haruo et al further shows that the shortest setback distance from the face surface to the tip surface of the upper core layer is equal to or less than a largest length of the recording core measured from the face surface.

With regard to claim 3, Haruo et al further shows  $D < 1.0 \mu\text{m}$  (Fig. 11; [0006]), and the setback distance from the face surface to the tip surface of the upper core layer L3 is substantially less than D and satisfies the relationship:

$$\text{about } 0 \mu\text{m} < L3 \leq \text{about } 0.8 \mu\text{m}.$$

With regard to claim 6, Haruo et al further shows that the tip surface of the upper core layer includes a curved surface which gradually recedes in the height direction (Fig. 11) and which recedes toward side surfaces of the tip surface, wherein the side surfaces are displaced apart from one another in the track width direction (Fig. 14).

With regard to claim 7, Haruo et al further shows that tangent lines that touch endpoints of the curved surface have an angle of inclination relative to the track width direction of about  $30^\circ$  to about  $60^\circ$  (Fig. 14).

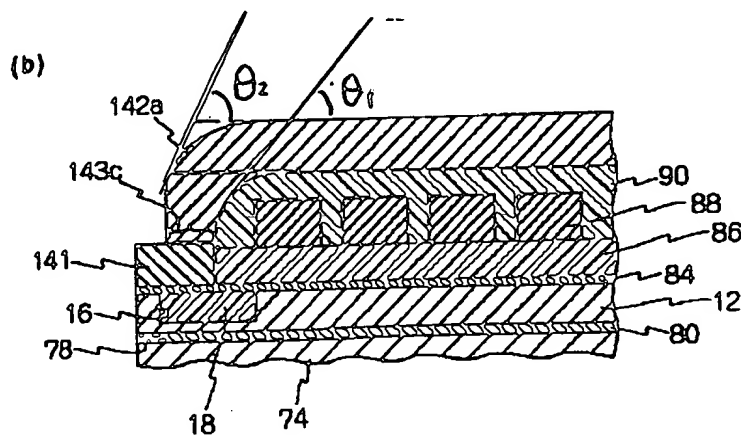
5. Claims 1, 4, 5, 8, 9, 10, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Haruo et al (JP 2000-011319) with embodiment shown in Figs. 9(a) to 9(c).

With regard to claim 1; Haruo et al shows a thin-film magnetic head in Fig. 9(b) including: a lower core layer 12; a recording core formed on the lower core layer and exposed at a face surface that faces a recording medium, the recording core including a structure having a gap layer 84 and an upper pole layer 141 sequentially arranged in that order; an upper core layer 142a magnetically coupled to the upper pole layer

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141; and a coil 88 for inducing a recording magnetic field to the lower core layer, the recording core, and the upper core layer, wherein a tip surface of the upper core layer 142a is located at a setback distance from the face surface in a height direction, wherein the height direction is a direction generally perpendicular to the face surface, and the tip surface is a curved surface, such that the setback distance gradually increases in a track width direction, wherein the track width direction is a direction generally parallel to the face surface (Fig. 9(c);

With regard to claims 4 and 5, Haruo et al further shows in Fig. 9(b) that the upper core includes a back surface which is set back from the tip surface in the height direction, wherein the back surface is a curved surface or an inclined surface in which the setback distance gradually increases in the track width direction (Fig. 9(c)) and the an inclination angle  $\theta_2$  is greater than an inclination angle  $\theta_1$ , where inclination angle



$\theta_1$  is the angle of a tangent line at a midpoint between an end of the curved surface near the recording core and an end of the curved surface near an underside of the

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upper core layer side, and angle  $\theta_2$  is the inclination of a tangent line at a midpoint between an end of the curved surface near the magnetic core and an end of the curved surface at an upper surface of the upper core layer (See attached Fig. 9(b) below) and the inclination angle  $\theta_2$  satisfies the relationship about  $60^\circ \leq \theta_2 < \text{about } 90^\circ$ .

With regard to claim 8, Haruo et al further shows in Fig. 2 that the upper core layer includes, a front region 142 which extends from the tip surface in the height direction and has a uniform width in the track width direction; and a back direction region (behind 142) which extends from a side opposite the tip surface in the height direction and in which the width of the back region in the track width direction gradually increases in the height direction.

With regard to claim 9, Haruo et al further shows that the upper core layer 142a further includes an edge surface in contact with the upper pole layer, and wherein, at the edge surface, the width of the upper core layer in the track width direction is greater than the width of the upper pole layer in the track width direction (Fig. 9(c)).

With regard to claim 10, Haruo et al further shows in Fig. 9(c) that the recording core includes a front region in 141 in Fig. 9(b), which extends from the face surface in the height direction and has a uniform width in the track width direction; and a back region in 141, which extends from the front region in the height direction and in which a width of the back region in the track width direction gradually increases in the height direction.

With regard to claim 11, Haruo et al further shows that the upper core layer 142a is connected to at least the back region of the recording core (Figs. 9(b) and (c)).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 12/1 and 13/12/1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 5,805,391) in view of Yamanaka et al (US 6,487,041).

With regard to claim 12/1, Chang et al shows a thin-film magnetic head in Fig. 4 including: a lower core layer PT1; a recording core formed on the lower core layer and exposed at a face surface that faces a recording medium, the recording core including a structure including a gap layer 76 and an upper pole layer PT2 sequentially arranged in that order; an upper core layer 74 magnetically coupled to the upper pole layer; and a coil 64 for inducing a recording magnetic field to the lower core layer, the recording core, and the upper core layer, wherein a tip surface of the upper core layer is located at a setback distance from the face surface in a height direction, wherein the height direction is a direction generally perpendicular to the face surface, and the tip surface is one of an inclined surface or a curved surface, such that the setback distance gradually increases in a track width direction, wherein the track width direction is a direction generally parallel to the face surface (Fig. 7).

Haruo et al is silent on the material of the gap layer.



Yamanaka et al shows a thin-film magnetic head in Fig. 2, wherein the gap layer can be made of non-magnetic conductive materials Au, Cu, NiP (Column 5, lines 12-16).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to use the material taught by Yamanaka et al for the gap. The rationale is as follows: Chang et al teaches a magnetic head but is silent on the material for making the gap layer. Yamanaka et al teaches that the gap layer can be made of Au, Cu, NiP (Column 5, lines 12-16). It is also well known in the art that these materials are commonly used in the art for making the gap layer. One of ordinary skill in the art would have been motivated to use those materials for making the gap. Such made gap layer includes nonmagnetic metallic material and materials selected from the group consisting of NiP, NiPd, NiW, NiMo, Au, Pt, Rh, Pd, Ru, and Cr.

#### **Conclusion**

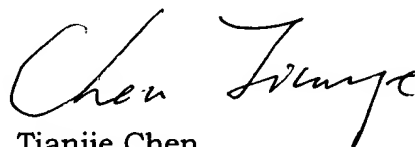
7. The prior art made of record in PTO-892 form and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is (703) 305-7499. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tianjie Chen  
Primary Examiner  
Art Unit 2652  
02/27/2004